

The Changing Picture in Surgery of Pulmonary Tuberculosis

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TO SEE IN WHAT WAYS the surgical treatment of pulmonary tuberculosis in recent years might reflect the general trend in treatment of the disease, which has been remarkably influenced by the pertinent antibacterial drugs, the authors reviewed their experience of the past 11 years in the operative treatment of 1,271 patients. It was hoped that the study might also give indication as to the direction surgical treatment might take in the immediate future.

The source of patients operated upon remained relatively constant, so that comparisons from year to year are valid. In the 11-year period of the study, 1,743 operations were performed upon 1,271 patients (Table 1). Eighty-one per cent (or 1,024) were patients treated in private practice who were referred from the Barlow Sanatorium or from medical colleagues in the vicinity. Nineteen per cent (or 247) were patients in the wards of two tax-supported hospitals.

SEX DISTRIBUTION

The ratio of female to male patients was a little more than six to four. That ratio remained fairly uniform over the period of study (Table 2) until the past year, when the proportion of males increased. The ratio was about the same for all types of operation with the exception that among patients who had resection the proportion of females was greater—about seven to three. Also, the female patients who had resection included a larger number with more extensive disease, so that among patients requiring pneumonectomy, female patients outnumbered males three to one. Conversely, in the group of patients needing the smallest amount of tissue resection (that is, segmental resection) the ratio of males to females was one to one.

TYPE OF OPERATION

In the eleven years covered by the study, pronounced changes took place in the type of operation performed (Table 3). In 1943 there were six minor

• In a review of the operative treatment of 1,271 patients with pulmonary tuberculosis in an 11-year period, it was noted that, beginning with 1947, there was a great increase, relatively, in the number of cases in which pulmonary resection was carried out. In 1943, the first year of the period of study, there were six minor operative procedures to every four major operations; in 1953 the ratio was one minor to nine major. This reversal reflects the discoveries of antibiotics for conservative therapy on the one hand and the advances in surgical techniques for major operative treatment on the other.

Now that it is safer, resection will probably be used more and more—including bilateral resection in "salvage" cases. On the other hand, with specific antibiotics available, there is a tendency at present to treat conservatively for longer periods in cases in which, formerly, minor operative procedures would have been carried out early.

procedures to every four major operations, but by 1953 the ratio was only one minor to nine major. Minor operations include phrenic nerve operations, severance of pleuropulmonary adhesions, rib resection for mixed tuberculous and pyogenic empyema and a few miscellaneous procedures. Major operations include the various extrapleural pneumonolytic procedures, pulmonary decortication, thoracoplasty and pulmonary resection.

PHRENIC NERVE OPERATIONS

In the year 1943, more patients had crushing of the phrenic nerve to produce paralysis of the diaphragm than any other operation (Table 3). As streptomycin and the other antibacterial drugs became available, and the use of pulmonary resection increased, crushing of the phrenic nerve was done in fewer and fewer cases. Other operations on the phrenic nerve, designed to produce a permanent diaphragmatic paralysis, have been abandoned.

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TABLE 1.—Extent of operation as related to sex of patients

Procedure	Male	PATIENTS		Total	Male	TABULATED BY OPERATIONS		Total
		No.	Pct.			No.	Pct.	
Minor	211	331	61	542	211	331	61	542
Major	270	459	63	729	454	747	62	1201
Total	481	790	62	1271*	665	1078	62	1743

*Private patients 1024 (80.7%). Public hospital patients 247 (19.3%).

TABLE 2.—Ratio of male to female patients in 11-year period

	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953	Total
Male	41	40	43	35	33	37	38	30	35	40	47	38
Female	59	60	57	65	67	63	62	70	65	60	53	62

TABLE 3.—Changing trends in use of various operations over an 11-year period

	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953	Total
Minor Operations:												
Phrenic nerve operation.....	42	36	36	39	33	23	26	13	7	4	5	264
Lysis and/or thoracoscopy.....	9	13	23	18	45	47	27	24	11	10	1	228
Rib resection.....	5	5	7	4	2	3	1	2	2	3	1	35
Miscellaneous	3	0	1	0	0	5	1	1	1	0	3	15
Total	59	54	67	61	80	78	55	40	21	17	10	542
Major Operations:												
Extrapleural lysis.....	1	1	2	0	1	2	0	7	2	3	0	19
Pulmonary decortication.....	0	0	0	0	0	1	4	1	0	5	2	13
Thoracoplasty	38	40	37	38	36	38	33	31	9	3	8	311
Pulmonary resection.....	0	5	6	16	29	29	39	40	64	78	80	386
Total	39	46	45	54	66	70	76	79	75	89	90	729
Total patients.....	98	100	112	115	146	148	131	119	96	106	100	1271

INTRAPLEURAL PNEUMONOLYSIS

Operations to sever pleuropulmonary adhesions and thus improve the effectiveness of artificial pneumothorax treatment were beginning to increase in 1943, as there was increasing acceptance of the dictum that pneumothorax complicated by adhesions should either be improved by the severance of adhesions or abandoned in favor of some other therapeutic procedure. Pneumonolysis and/or thoracoscopy operations increased steadily to a peak in 1948 (Table 3) and then rapidly declined almost to the vanishing point. This decline was not due to the abandonment of the belief that adhesions complicating artificial pneumothorax should be severed, but rather to the abandonment, by the authors' medical colleagues, of artificial pneumothorax as a treatment of pulmonary tuberculosis. The substitution of resection for pneumothorax was due, in a large measure, to the advent of the antibacterial drugs and the subsequent lowering of the risks of excisional operations; and in lesser degree it was owing to a growing feeling on the part of both physicians and patients against pneumothorax and its complications.

THORACOPLASTY

Eleven years ago thoracoplasty had reached a fairly stable position in the treatment of pulmonary

tuberculosis. An operation performed usually in two or three stages, and tailored to the individual patient to produce the maximum collapse of the chest wall over the diseased area and still preserve the greatest possible function in the undiseased lung was the accepted goal. The number of patients upon whom the authors performed this operation remained remarkably constant over a period of six years from 1943 to 1949 (Table 3), but in 1949 the number of patients having excisional operation exceeded for the first time the number having thoracoplasty, and after that there was a rapid decline in thoracoplasty. (These data refer to thoracoplasty done as a therapeutic measure and exclude those done for space-reducing reasons with excisional operation.) This decline occurred in spite of the facts that the results of thoracoplasty were very good, and no one had clearly demonstrated that excisional operation would produce any greater improvement in the number of patients rehabilitated. But thoracoplasty is a deforming operation, even though the extent of the deformity can be kept to a minimum with proper postoperative care. Also it is, for most surgeons, a multi-stage operation. These two characteristics are of considerable importance in lessening the use of the operation.

TABLE 4.—The effect of antibacterial drugs on mortality rates among patients surgically treated

	No. of operations	Early Mortality		Late Mortality		Total Mortality	
		No.	Pct.	No.	Pct.	No.	Pct.
No TB antibacterial drugs—to 1947.....	56	3	5.4	6	10.7	9	16.1
Short term drug therapy—1948-1951.....	172	7	4.1	4	2.3	11	6.4
Long term drug therapy—1952-1953.....	158	3	1.9	1	0.6	4	2.6
Total.....	386	13	3.4	11	2.8	24	6.2

TABLE 5.—Changes in extent of pulmonary resection in an 11-year period

	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953	Total
Less than one lobe.....	0	—	—	—	—	1	—	2	3	31	19	56
One lobe.....	0	1	1	3	4	9	15	20	39	32	34	158
One lobe plus segment.....	0	—	—	—	1	1	3	6	10	9	10	40
One lung.....	0	4	5	13	24	18	21	12	12	6	17	132
Total resections.....	0	5	6	16	29	29	39	40	64	78	80	386

TABLE 6.—Resections compared to other surgical collapse procedures

	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953
Pulmonary resections.....	0	5	6	16	29	29	39	40	64	78	80
Surgical collapse procedures.....	89	89	96	95	114	108	86	68	27	17	14

EXTRAPLEURAL PNEUMONOLYSIS

During the 11-year period of the present study the authors have made very little use of the various extrapleural pneumonolytic procedures that require the use of air or some other foreign body to maintain the pulmonary collapse obtained by the operation. The enthusiasm in some quarters for the newer polyethylene and other plastic preparations⁵ as a plom-bage material has not appreciably altered the authors' dislike for the use of foreign bodies as an aid to pulmonary collapse.

MISCELLANEOUS OPERATIONS

While the number of cases of tuberculous empy-ema with mixed infection has decreased over the past decade, surgical drainage was required as a part of the treatment in a few cases in the present series. Other minor procedures, such as the drainage of abscesses of the wall of the chest, excision of tuberculous sinuses, et cetera, are still being done in limited numbers.

PULMONARY RESECTION

In 1943, although the authors performed pulmonary resection in 16 cases for other diseases, no tuberculous patients were so treated—this despite the fact that one of us (J.C.J.) was co-author of one of the first publications dealing with resection in the treatment of pulmonary tuberculosis.² But during the next four years, even though there was a high morbidity and mortality connected with the operation^{1, 3, 4} an increasing number of resections was done (Table 3)—chiefly in patients in whom all other measures had failed, or who had so much

tracheobronchial disease as to make them very poor candidates for other surgical measures. But by 1948 the antibacterial drugs effective against tuberculosis were available and had so reduced the hazards of excisional operation as to bring about a rapid increase in the use of this surgical therapeutic measure (Table 4). The number of patients having resection of lobes or parts of lobes rose particularly rapidly. While the authors have not shared the enthusiasm of some investigators for the resection of the very small residual foci remaining after long continued antibacterial treatment, there was an increase, in the last three years of the period covered, in the number of patients having resection of only one or two segments of a lobe and concomitantly a decline in the use of pneumothorax (Table 5).

DISCUSSION

When the number of patients having resection is compared with the number having all other surgical procedures (Table 6), it is noteworthy that the rapid increase in the number of pulmonary resections and the accompanying decrease in other surgical procedures which was so apparent between 1947 and 1951, both leveled off in 1952 and 1953. It would appear that the transition from the thoracoplasty-pneumothorax era to the pulmonary resection era has been completed and that some predictions may be haz-arded regarding the operative treatment of pulmonary tuberculosis in the immediate future.

There will no doubt continue to be a few patients who, for one reason or another, will not be suitable candidates for pulmonary resection, and in whom phrenic nerve crush, thoracoplasty or the extrapleural pneumonolysis procedures with or without

plombage, will be done, either in preparation for, or in preference to, resection. Likewise, for many years there will continue to be a certain number of "salvage" patients in whom resection will be the only effective treatment. In this category may be included patients with residual pulmonary suppurative disease resulting from tuberculous bronchitis, patients in whom collapse therapy has failed to effect a cure, patients with disease previously controlled but again become active, and patients with such extensive pulmonary destruction that no other measure will be effective.

There will be increasing use of bilateral resection, or of resection combined with some other surgical measure in treating some of these "salvage" patients. In this respect, pulmonary or cardiopulmonary function studies made before and in the interval between multiple procedures will be of great help in selecting patients suitable for surgical intervention and in determining the type and amount of operation to be done. And there will be a certain number of patients who will continue to have tubercle bacilli in the sputum and/or x-ray evidence of cavitory disease after long-term antibacterial drug therapy, and for whom excisional operation is unquestionably indicated. The future treatment of small, residual caseous, caseofibrotic or upper lobe bronchiectatic disease, however, is quite uncertain. Undoubtedly there

is a tendency at present away from the resection of such small lesions, and toward ever longer drug therapy. But whether that trend will continue or will be reversed will depend upon many things. Of great importance will be the results of careful, long term follow-up studies of both the excisional and the non-excisional groups of patients.

At present it would appear that the wisest course to follow is to study each patient, rather than to apply to his case a categorical list of indications for resection. Each patient should have the benefit of a careful appraisal by a team composed of internist, pathologist and surgeon before a decision is reached regarding a recommendation for surgical intervention.

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